CLAIMS

1. Isolated JAK2 protein (Janus kinase 2) characterized in that it comprises a mutation on amino acid 617, more particularly the V617F mutation, hereinafter called "JAK2 V617F variant" whose sequence is shown in SEQ ID N°1, or a similar sequence in other mammals.

2. Nucleotide sequence encoding the JAK2 V617F variant according to claim 1, in particular sequence SEQ ID N°2 having the t/g mutation at position 1849 starting at the ATG marking the start of transcription.

3. Cloning and/or viral expression vector, either plasmid or in naked DNA form, characterized in that it comprises the sequence according to claim 2 under the control of an efficient promoter in mammalian cells.

4. Mammalian cell expressing the recombinant JAK2 V617F variant according to claim 1.

5. Non-human transgenic animal expressing recombinant JAK2 V617F according to claim 1.

6. Non-human transgenic animal according to claim 5, characterized in that it is a mouse or rat having integrated into its genome at least the sequence encoding JAK2 V617F by homologous recombination or directed recombination.

7. Non-human transgenic animal according to claim 5 or 6, characterized in that it is homozygous JAK2 V617F / JAK V617F or heterozygous JAK2 V617F / JAK2, said animals reproducing Vaquez polyglobulia and/or myeloproliferative disorders induced by JAK2 V617F.

8. Probes or primers comprising 10 to 30 consecutive nucleotides of sequence SEQ ID N° 3 or 4 and comprising the mutated nucleotide t^{1849}.

9. Probes or primers according to claim 8 chosen from among sequences SEQ ID N°5 to 11 and 15 to 28.

10. *Ex vivo* or *in vitro* method to determine the presence or absence of the G1849T variant of the JAK2 gene in a sample from a patient suffering from PV or likely to develop PV or any other myeloproliferative disorder, in particular erythrocytoses, hyperleukocytoses, thrombocytoses and myelofibroses, method comprising:

a) obtaining a nucleic acid sample from the patient

b) detecting the presence or absence of the G1849T variant of the JAK2 gene in said nucleic acid sample,

characterized in that the presence of the G1849T variant is an indication of PV or of any other myeloproliferative disorder.

11. Method according to claim 10, characterized in that it comprises a hybridisation step with at least one probe according to either of claims 8 to 9.

12. Method according to claim 10 or 11, characterized in that it comprises an amplification step by PCR reaction with at least one pair of primers according to either of claims 8 to 9.

13. Method according to any of claims 10 to 12, characterized in that it is performed on the mRNA of an individual and comprises a RT-PCR reaction.

14. Method according to any of claims 10 to 12, characterized in that it comprises an amplification step by means of said primers, followed by a hybridisation step with at least one probe, preferably two probes which hybridise

under conditions of high stringency to the sequences corresponding to the region of the G1849T mutation, and detection of the signal produced by the markers of said probes, the probes and primers being defined in claim 8 or 9.

15. Method according to claim 10 comprising the detection of the presence or absence of the G1849T variant of the JAK2 gene in said nucleic acid sample by means of one or more SNPs (Single Nucleotide Polymorphism) specific to the G1849T mutation of the JAK2 gene, in particular sequences SEQ ID N° 17 and 18, 23 and 24 or 27 and 28.

16. *Ex vivo* or *in vitro* method to detect the presence or absence of the JAK2 V617F variant in a sample from a patient suffering from or likely to develop PV or any other myeloproliferative disorder, method comprising:

a) obtaining a sample from the patient,

b) detecting the presence or absence of the JAK2 V617F variant,

characterized in that the presence of said variant is an indication of PV or of any other myeloproliferative disorder.

17. Method according to claim 16 comprising the contacting of the sample with an antibody specific to the V617F variant of the JAK2 protein, preferably an antibody capable of making the distinction between the V617F variant and the non-mutated JAK2 protein.

18. Method according to claim 17, characterized in that the antibodies are monoclonal or polyclonal antibodies, single chain or double chain, chimeric or humanised antibodies or binding fragments to the antigen F(ab')2 and F(v).

19. Method according to claim 18, characterized in that it is an ELISA test.

20. Method according to any of claims 10 to 19, characterized in that it is conducted for the sub-population of patients showing a hematocrit level of over 51%.

21. Method according to any of claims 10 to 19, characterized in that it is conducted for the sub-population of patients showing a platelet count of more than 450 000.

22. Monoclonal antibody specifically recognizing the JAK2 V617F variant.

23. Hybdridoma producing an antibody according to claim 22.

24. Kit for detecting the JAK2 V617F variant in a tumour comprising one or more primers or probes such as defined in claim 8 or 9 for the specific detection of the presence or absence of the G1849T mutation in the JAK2 gene.

25. Kit for determining whether a patient is suffering from Vaquez polyglobulia or from any other myeloproliferative disorder involving the JAK2 V617F variant, in particular erythrocytoses, hyperleukocytoses, thrombocytoses and myelofibroses, comprising one or more probes or primers such as defined in claim 8 or 9 for the specific detection of the presence or absence of the G1849T mutation in the JAK2 gene.

26. Kit according to claim 24 or 25 also containing at least one element chosen from among a heat resistant polymerase for PCR amplification, one or more solutions for amplification and/or the hybridisation step and any reagent allowing the detection of the marker.

27. Kit to determine whether a patient is suffering from Vaquez polyglobulia or any other myeloproliferative disorder involving the JAK2 V617F variant, containing an antibody according to claim 22.

28. siRNA capable of reducing by more than 50%, or more than 95%, the expression of the JAK2 V617F variant according to claim 1.

29. siRNA according to claim 28, characterized in that it has 19 to 25 nucleotides, preferably 19 nucleotides in length, the sequence of a first strand being identical and the sequence of a second strand being complementary to sequence SEQ ID N°3, SEQ ID N°4 or SEQ ID N°11 comprising the mutated t^{1849} nucleotide.

30. siRNA according to claim 28 or 29, characterized in that it induces a reduction of more than 80% or 95% of the expression of JAK2 V617F and in that it only induces a reduction of less than 25% or 5% of the expression of wild-type JAK2.

31. siRNA according to claim 28, characterized in that it is chosen from the group consisting of:

- UGGAGUAUGUUUCUGUGGA (SEQ ID N° 29)
- GGAGUAUGUUUCUGUGGAG (SEQ ID N° 30)
- GAGUAUGUUUCUGUGGAGA (SEQ ID N° 31).

32. Method with which to determine the specific inhibition of JAK2 V617F by one or more compounds comprising the steps consisting of:

a) contacting one or more compounds with the JAK2 V617F protein according to claim 1, a membrane fraction containing JAK2 V617F, or a cell expressing JAK2 V617F according to claim 4 under suitable conditions for fixing and/or inhibition, and

b) detecting the specific fixing and/or inhibition of JAK2 V617F.

33. Screening method comprising a succession of tests according to claim 32 of several molecules and a selection

step to select molecules having an IC50 for JAK2 V617F that is less than 1 μM, preferably 100 nM.

34. Method according to claim 33 also comprising a negative selection of the molecules having an IC50 for JAK2 of less than 5 μM or 1 μM.

35. *In vitro* screening method according to any of claims 32 to 34, wherein the inhibition of JAK2 V617F phosphorylation is determined by immunoprecipitation.

36. *In vivo* screening method according to any of claims 32 to 35 on primary CD34+ JAK2 V617F progenitor cells which are capable of differentiating without erythropoietin (Epo), or on cell lines which have become factor independent through the introduction of the JAK2 V617F variant.

37. *In vivo* screening method according to any of claims 32 to 36 using a cell according to claim 4.

38. Method for identifying candidate medicinal products comprising the steps of:

a) administering compounds to a non-human transgenic animal expressing JAK2 V617F such as defined in any of claims 5 to 7, said animal reproducing Vaquez polyglobulia and/or having a myeloproliferative disorder associated with the presence of JAK2 V617F.

b) determining the effect of the compound and selecting the candidate medicinal products which are seen to reduce or block the proliferation and spontaneous differentiation of the erythroblasts of Vaquez polyglobulia, or to reduce cell proliferation associated with the presence of JAK2 V617F.

39. Use of the siRNAs according to any of claims 28 to 31 to produce a medicinal product.

40. Use according to claim 39 to prepare a medicinal product intended for the treatment of malignant hemopathies, in particular myeloproliferative disorders including Vaquez polyglobulia, essential thrombocythemia, myeloid splenomegaly or primitive myelofibrosis.

41. Use according to claim 39 to prepare a medicinal product intended for the treatment of myeloproliferative disorders associated with the JAK2 V617F mutation, and other malignant hemopathies and solid tumours such as carcinomas, melanomas and neuroblastomas, which express JAK2 V617F.

42. Composition comprising a siRNA according to any of claims 28 to 31 and a pharmaceutically acceptable vehicle.